

# In-Space Assembly (ISA) for SDC

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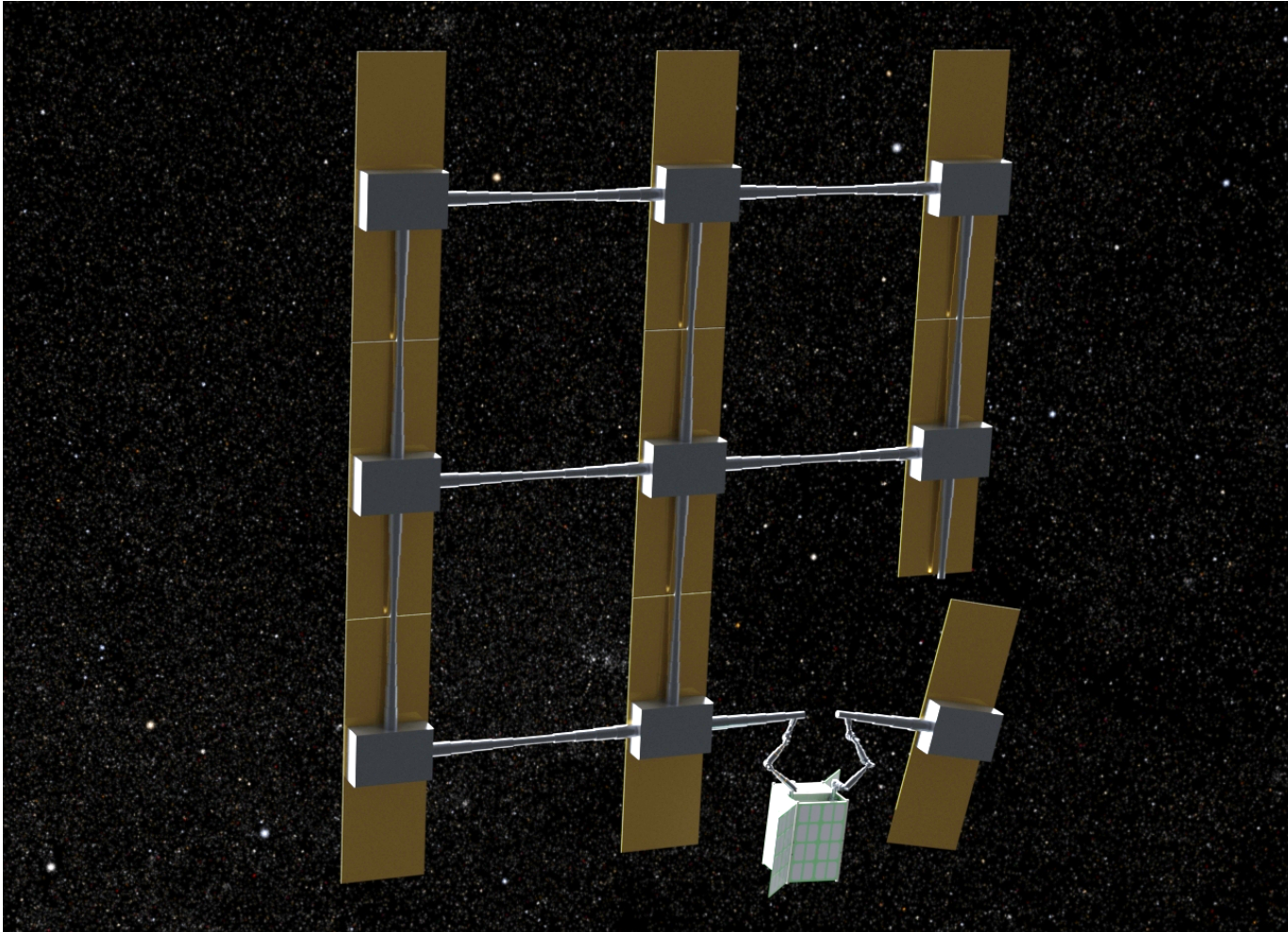


**Jet Propulsion Laboratory**  
California Institute of Technology



# CubeSat In-space Assembly (ISA)

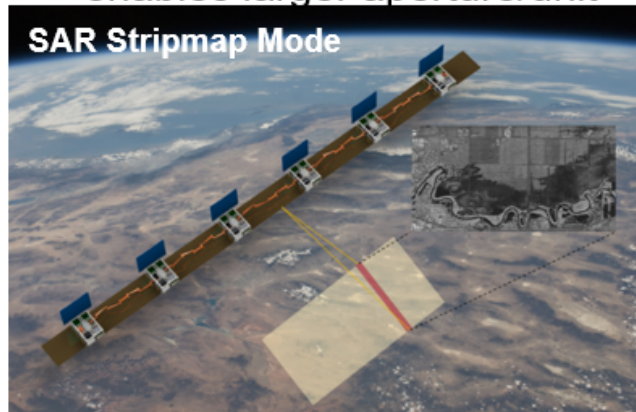
Tug CubeSat assembles modules



# C-FORM: Cluster Forming On-board Robotic Manipulator

Individual CubeSats rendezvous and assemble

**Large Aperture Assembly:** Separation distance enables larger aperture/unit



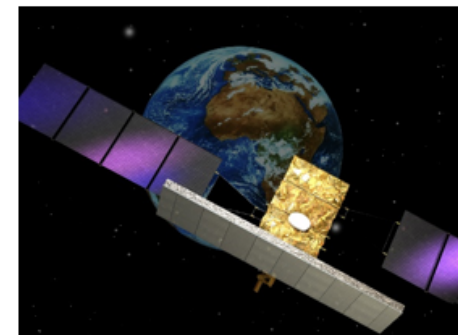
**Relative Repositioning:** Scan or stare with instruments, adjust alignment



**Reconfiguration:** Add additional capability or replacement individual units

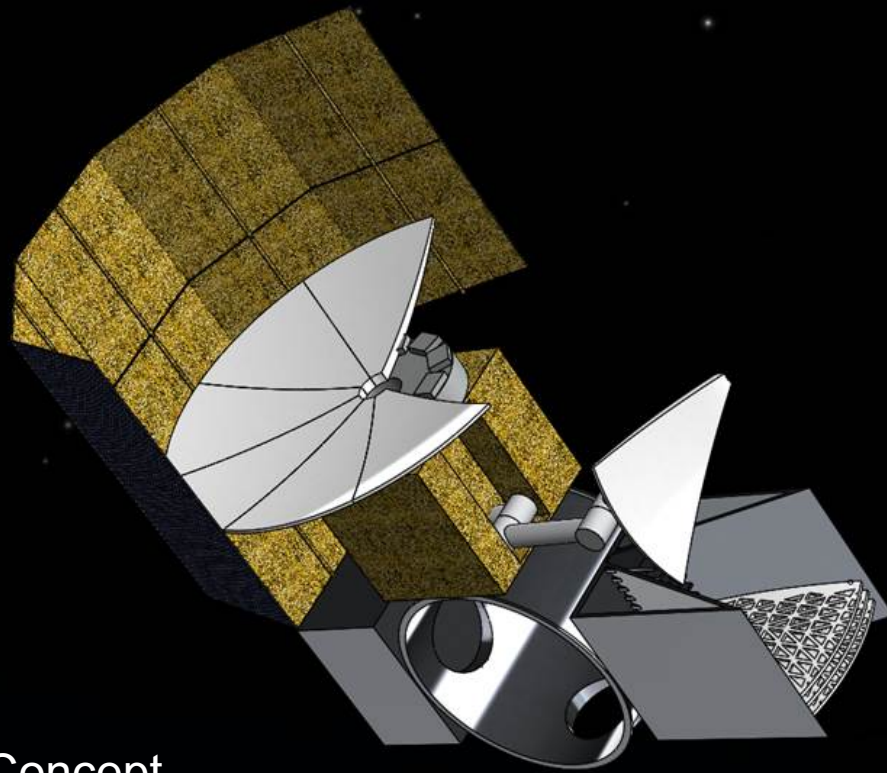


**Comparison:** COSMO-SKYMED SAR Satellite



COSMO-SKYMED Rendering (ESA)

# Assembly from Secondary Launches



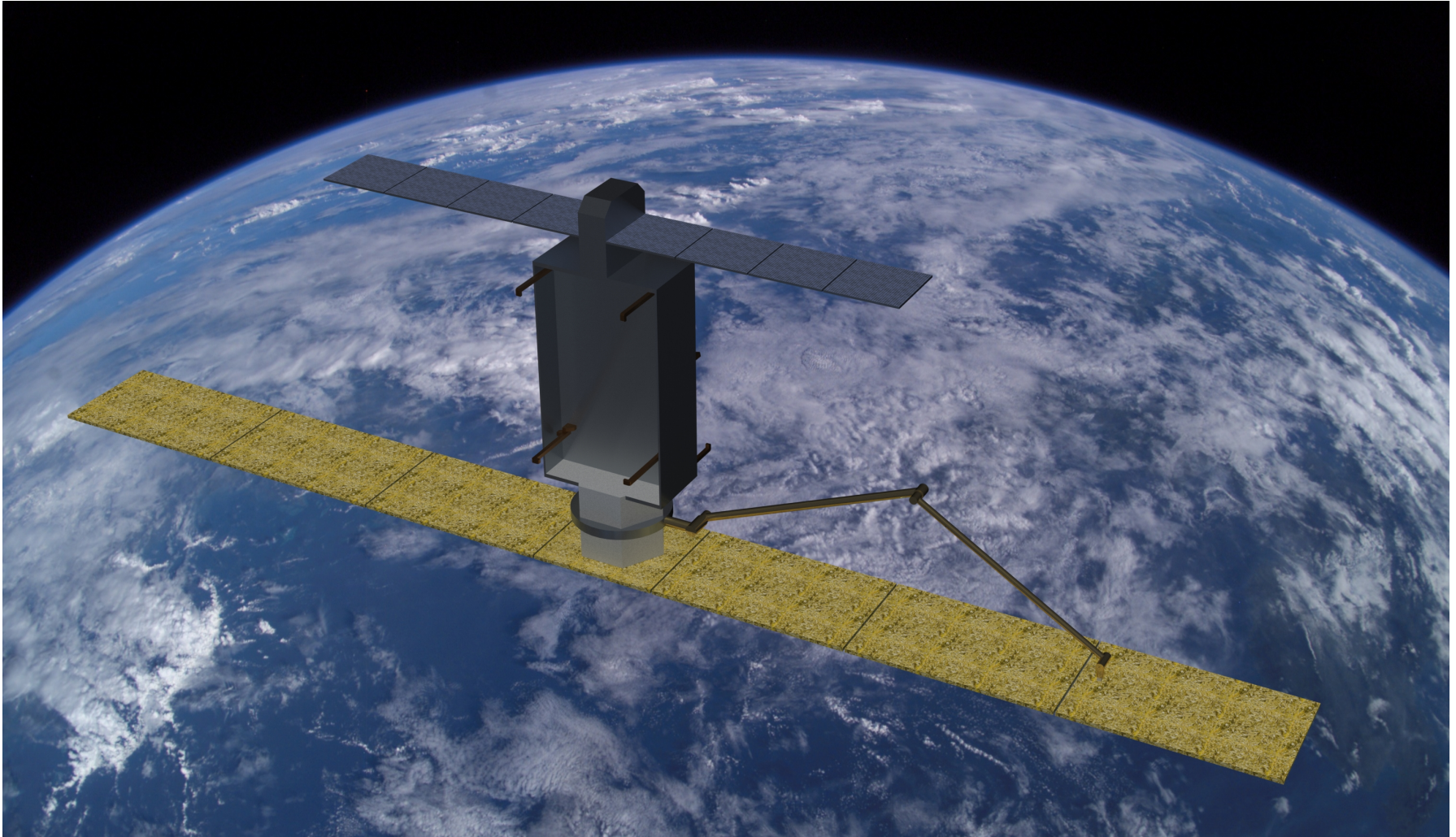
Artist's Concept

Pre-Decisional Information – For Planning and Discussion Purposes Only

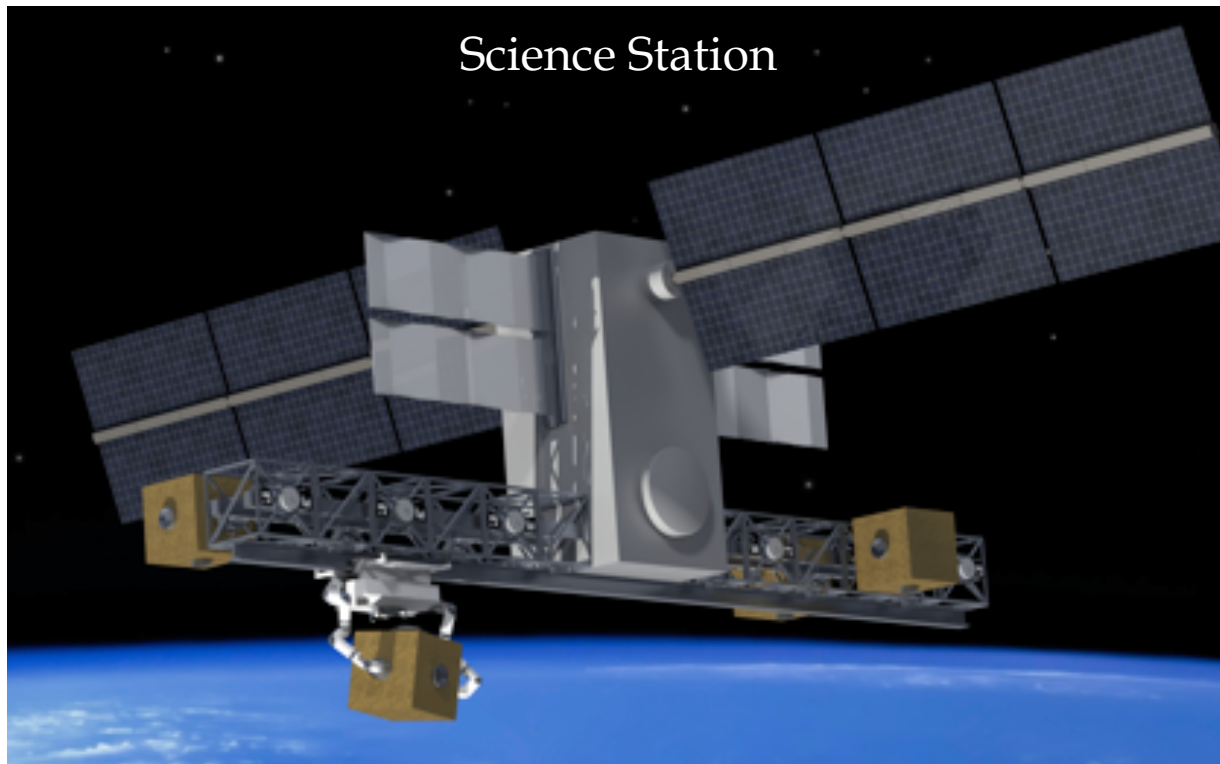
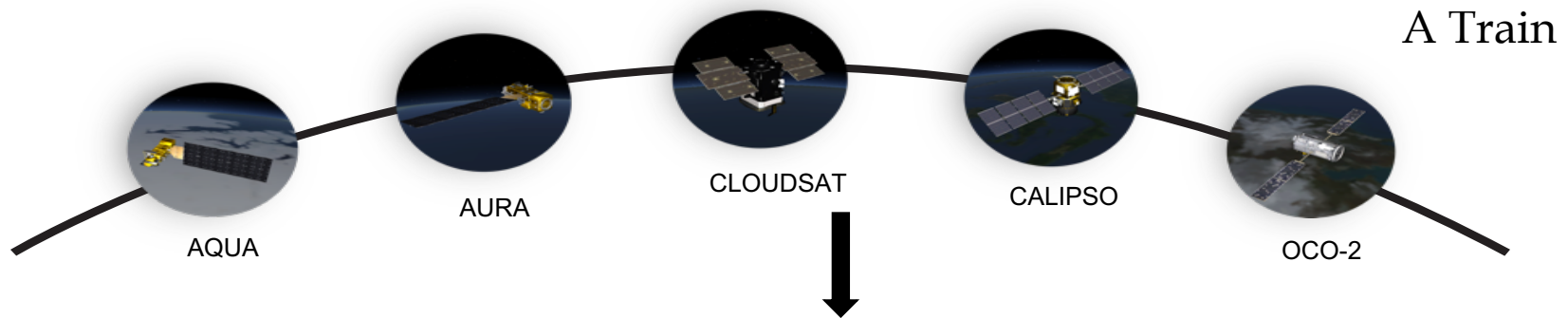


# Traditional Launch In-Space Assembly (ISA)

On-board robotic arm assembles large structures from on-board components



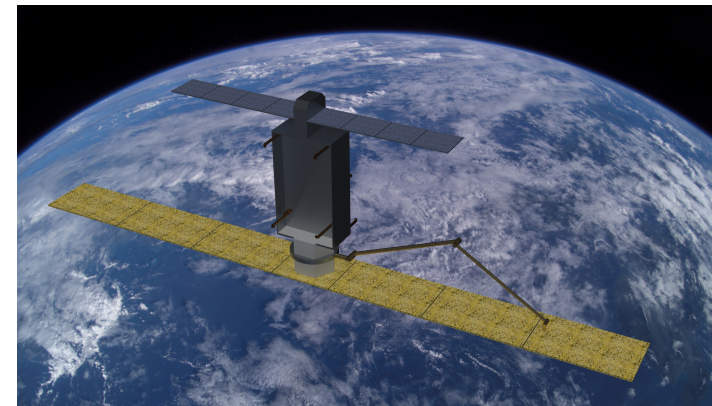
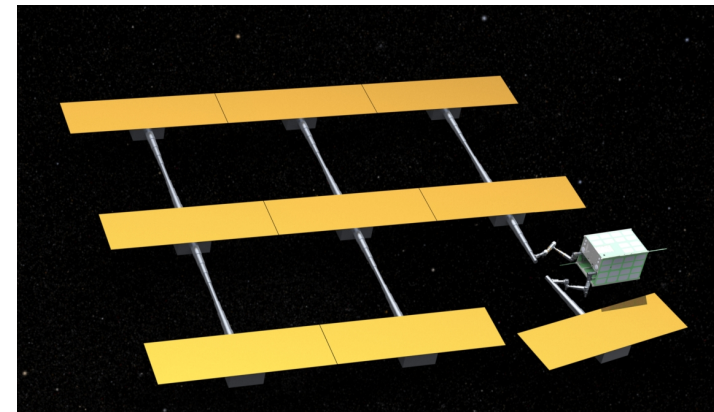
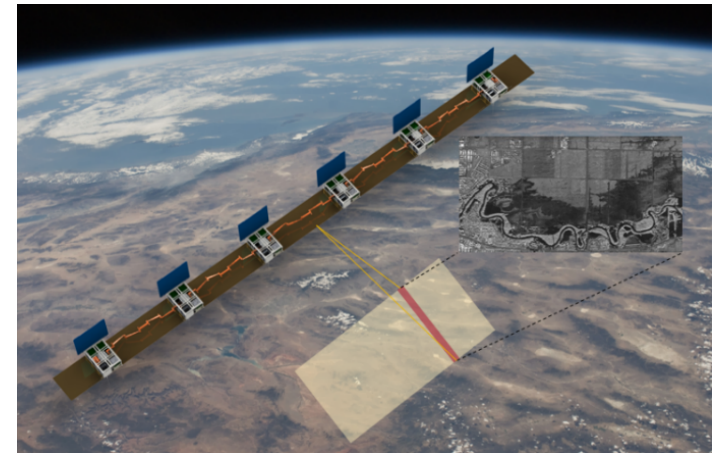
# Persistent Platform in LEO





# Benefits to ISA

- Enabling for sizes not possible today
- Enabling for frequencies not possible today
- Traditional or secondary launch vehicle
- Flexibility in different implementations
- Higher stiffness
  - Folding techniques require depth to hold the structure rigid that is difficult incorporate in the fold
- High aspect ratios
  - Tension techniques require nearly equal aspect ratios for stability and flatness
- Higher launch packing efficiency
- Once developed, feed forward to other missions
  - same basic architecture/implementation



**BACK-UP**



# Assembly Demonstration Video



## In-Space Telescope Assembly Robotics Risk Reduction

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Jason Carlton, Kyle Edelberg, Blair Emmanuel, Dr. Sisir Karumanchi,  
Brett Kennedy, Dr. Junggon Kim, Jeremy Nash, Russell Smith

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DARPA Tactical Technology Office

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# REMORA Video



## REMORA: *Reconfigurable Miniature Orbital Robotic Asset*

In-Lab Demo: Oct 31, 2017

Principal Investigator: Dr. Rudranarayan Mukherjee  
Team: Ryan McCormick (Technical Lead), Spencer Backus, Kristopher Wehage, Alexander Austin

Program Manager: Dr. Gordon Roesler  
DARPA Tactical Technology Office

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